

In the Claims

This listing of claims will replace all prior versions and listings of claims in the application:

1 1. (Currently Amended) An apparatus for measuring speaker
2 cone displacement relative to a fixed position in an audio speaker
3 having a voice coil aligned with the speaker cone along an axis,
4 the apparatus comprising:

5 (a) a variable reluctance sensor device; said sensor device
6 including a first unit fixed relative to said fixed position; and a
7 second unit ~~mounted for movement with~~ affixed to said speaker cone
8 effecting relative motion between said first unit and said second
9 movement through motion of said speaker cone at a position on said
10 cone radially offset from said axis;

11 (b) a signal injecting circuit coupled for injecting a
12 predetermined input signal into one of said first and second units;
13 and

14 (c) a signal receiving circuit coupled with said one of said
15 first and second units for receiving a signal resulting from
16 modulation of said input signal due to variation of reluctance of
17 said sensor device caused by displacement of said first unit
18 relative to said second unit, and for generating an indicating
19 signal based upon said resulting signal; at least one signal
20 characteristic of said indicating signal being related with said
21 cone displacement.

1 2. (Previously Presented) The apparatus of Claim 1, wherein
2 said first unit comprises a core structure; and wherein said second
3 unit comprises a electromagnetic coil structure.

1 3. (Currently Amended) The apparatus of Claim 1 wherein said
2 second unit is ~~mounted~~ affixed to said speaker cone at a

3 substantially stationary node ~~on~~ of any modal vibration of said
4 speaker cone.

1 4. (Previously Presented) The apparatus of Claim 3, wherein
2 said second unit is mounted on said cone using a wedge.

5 to 6. (Cancelled)

1 7. (Previously Presented) The apparatus of Claim 1, wherein
2 said first unit comprises an electromagnetic coil structure; and
3 wherein said second unit comprises a core structure.

1 8. (Currently Amended). ~~The~~ An apparatus of Claim 7, for
2 measuring speaker cone displacement relative to a fixed position in
3 an audio speaker having a voice coil aligned with the speaker cone
4 along an axis, the apparatus comprising:

5 (a) a variable reluctance sensor device; said sensor device
6 including a magnetic coil structure fixed relative to said fixed
7 position; and a core structure affixed to said speaker cone
8 effecting relative motion between said first unit and said second
9 movement through motion of said speaker cone at a position on said
10 cone radially offset from said axis; wherein said ~~first unit~~
11 ~~comprising said~~ electromagnetic coil structure operates as at least
12 part of a high pass filter having a corner frequency; ~~and~~

13 (b) a signal injecting circuit coupled for injecting a
14 predetermined input signal into one of said first and second units;
15 said predetermined input signal has a frequency substantially below
16 said corner frequency; and

17 (c) a signal receiving circuit coupled with said one of said
18 first and second units for receiving a signal resulting from
19 modulation of said input signal due to variation of reluctance of
20 said sensor device caused by displacement of said first unit

21 relative to said second unit, and for generating an indicating
22 signal based upon said resulting signal; at least one signal
23 characteristic of said indicating signal being related with said
24 cone displacement.

9 to 20. (Cancelled)

1 21. (Currently Amended) ~~The An apparatus of Claim 2,~~ for
2 measuring speaker cone displacement relative to a fixed position in
3 an audio speaker having a voice coil aligned with the speaker cone
4 along an axis, the apparatus comprising:

5 (a) a variable reluctance sensor device; said sensor device
6 including a core structure fixed relative to said fixed position;
7 and a magnetic coil structure affixed to said speaker cone
8 effecting relative motion between said first unit and said second
9 movement through motion of said speaker cone at a position on said
10 cone radially offset from said axis; wherein said ~~second unit~~
11 ~~comprising said~~ electromagnetic coil structure operates as at least
12 part of a high pass filter having a corner frequency; and

13 (b) a signal injecting circuit coupled for injecting a
14 predetermined input signal into one of said first and second units;
15 said predetermined input signal has a frequency substantially below
16 said corner frequency; and

17 (c) a signal receiving circuit coupled with said one of said
18 first and second units for receiving a signal resulting from
19 modulation of said input signal due to variation of reluctance of
20 said sensor device caused by displacement of said first unit
21 relative to said second unit, and for generating an indicating
22 signal based upon said resulting signal; at least one signal
23 characteristic of said indicating signal being related with said
24 cone displacement.